

## Family: Amaryllidaceae

- *Allium sativum* — garlic
- *Allium cepa* — onion
- *Allium ampeloprasum* - leek



### Postharvest diseases of Onion and Garlic

- White rot - *Sclerotium cepivorum*
- Smudge or Anthracnose - *Colletotrichum circinans*
- Fusarium Basal rot - *Fusarium oxysporum*
- Blue mold rot - *Penicillium* spp.
- Bacterial Soft Rot
- Black mould - *Aspergillus niger*
- Pink rot - *Pyrenochaeta terrestis*
- Internal bulb rot - *Macrophomina phaseolina*
- Neck rot - *Botrytis allii*

## **White rot - *Sclerotium cepivorum* (*S. rolfsii*)**

Is one of the most serious diseases of onions

Can survive in soil for more than 20 years

Produces the phytotoxin oxalic acid

## **White rot - *Sclerotium cepivorum* (*S. rolfsii*)**

- Leaves decay at the base, turn yellow, wilt, and collapse over
- Roots and bulbs - covered with a fluffy white mycelium
- Affected bulbs may become watery, and the outer scales crack as the bulb dries and shrinks
- Small black sclerotia form on and in affected bulb parts



### Mode of spread and survival

- Cool weather - needed for germination of sclerotia and hyphal growth
- Mycelium - encounters a host root, the fungus will form appresoria
- Mycelium can grow outwards from the roots of one plant to the roots of an adjacent plant

### Control

- Rotating out of *Allium* crops
- Destroying infected tissue
- Planting disease - free seed stock
- Seed dressing with benomyl or carbendazim(100-150g/kg of seed)



Sclerotia of the White Rot fungus developing on an infected garlic bulb

## Smudge or Anthracnose

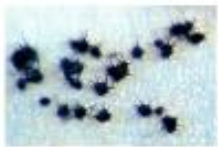
Pathogen: *Colletotrichum circinans*

Primarily affects white onions at harvest and during storage.



# Symptoms

- Infection occur on mature and stored bulbs.
- The external symptoms are minute dark green to black bodies, often concentric circles, forming smudgy spots of the order of 1 cm in diameter
- Under moist conditions these minute bodies develop into asexual spore bearing structures (acervuli), in which cream-coloured spore masses and dark hair-like projections (setae) may be seen with the aid of hand lens.
- Sunken pale patches appear on the lower part of the leaves then turn greyish and darker.
- The leaves become cruel



## **Importance**

Damping-off occurs on seedlings and can lead to total loss.

It is well known on white cultivars, although it affects coloured onions.

## **Environmental conditions**

Warm and humid conditions are favourable for this fungus.

## **Survival**

The fungus can persist in the soil for many years.

## **Spread**

It is transmitted to new areas on infected planting material.

## **Management**

### CULTURAL CONTROL

#### *Before planting:*

- Use a 2-3-year rotation.
- Choose land with good drainage.
- Ensure that seed is clean and that transplants are healthy.

#### *During growth:*

Do not harvest crops during wet weather.

#### *After harvest:*

If infected bulbs are seen at harvest keep them separate from those that appear healthy.

Dry bulbs after harvest and before storage and marketing.

Place the bulbs in a dry windy place under sunlight for a few days.

### RESISTANT VARIETIES

Varieties of onions with coloured outer scale leaves have resistance to smudge due to the presence of phenolic compounds that have antifungal properties.

### CHEMICAL CONTROL

First priority should be to control the disease using cultural methods and/or resistant varieties.

If fungicides are needed and considered economic, use mancozeb or chlorothalonil.



## **Fusarium Basal rot - *Fusarium oxysporum* f. sp. *cepae***

The disease affects all allium species but is most damaging in onion and garlic production.

### **Symptoms**

- Plants - show reduced emergence, yellowing and/or browning (necrosis) of leaves beginning at tips
- Reduced bulb size, bulb decay, and brown, poorly developed root systems
- In storage - bulbs show spongy, sunken, yellow brown rotting lesions



### **Symptoms**

- In early stages - infected bulbs are softened, brown and watery when cut open
- White, light pink or reddish fungal growth covering the cloves or in rot cavities
- Deep cracks form in the cloves, followed by break down of the tissue, which will eventually dry down to a portion of its original size, the cloves becoming crinkled and small



*Fusarium* sp. on garlic basal plate



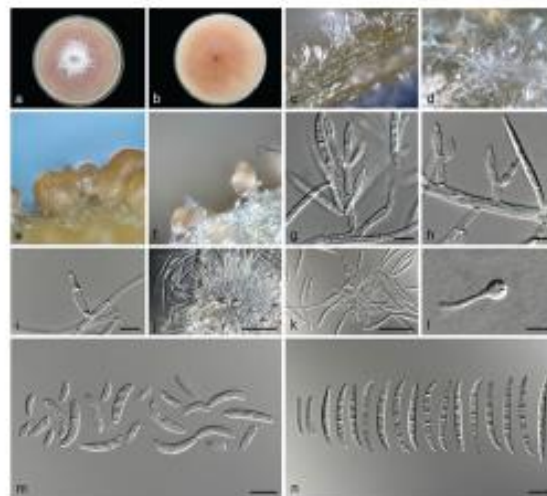
*Fusarium* infection of garlic clove. Note the sunken appearance of the clove, and presence of the fungus.

## Disease Cycle

- Soil borne fungus and can persist for long periods in the soil
- Transmission - infested soil on tools or equipment, infected debris, infected seed, or run-off water
- Pathogen enters the plant through wounded tissue
- Disease develops from the base of the bulb and progresses towards the tips of the cloves

## Environment condition

- Favored by higher RH and temperatures(20-30°C)



## Management

- Avoid rotations with *Allium* spp.(e.g. onions and leeks) and cereals
- Store bulbs at cool temperatures and low humidity with good ventilation
- Avoid storing damaged bulbs

## Blue mold rot

Pathogen: *Penicillium* spp.





# Symptoms

- A bluish green colour powdery mould is observed on cloves in soil and in storage.
- Infection first occurs on wounds.



## Spread

Air borne conidia spread the disease.

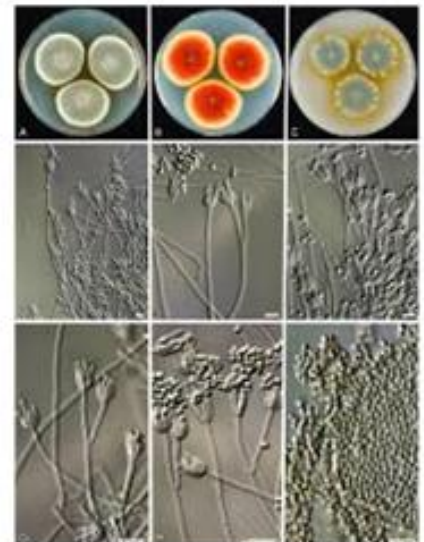
## Survival

In the field, the fungi causing the disease can survive in soil, seeds (cloves), plant debris, and air.

The fungi cannot penetrate healthy plants, as they can infect plants only through existing wounds or natural openings

## CONTROL

- Bulbs are harvested carefully to avoid wounds and hurting, then promptly dried or preserved.
- Control insects.
- Store bulbs at a maximum temperature of 5°C and at low relative humidity.
- Highly relative humidity conditions of storage could also cause *Penicillium* epidemics



# Onion and Garlic Bacterial Soft Rot

**Pathogens:** *Erwinia carotovora*  
*E. chrysanthemi*  
*Pseudomonas gladioli*  
*Enterobacter cloacae*

**Bacterial soft (wet) rot affects also other vegetables:**

- carrots
- potato
- cabbage
- pepper

Soft rots generally appear just before or at harvest, or during storage.



## Symptoms

- Softening and water soaking of one or more of the inner fleshy scales of the bulb.
- Affected tissue is yellow initially then turning brown as the disease progresses .
- The neck of the infected bulbs maybe soft when pressed.



## Spread

The pathogens are soilborne and may spread through irrigation water or splashing water from rain or irrigation.

By insects.



## Environment condition

Most of these pathogens are favored by warm temperatures (20-30 ° C) and wet conditions.



## Management

Cultural controls are critical for **preventing** these diseases.

Preventive applications of copper can reduce their development under conditions that favor the diseases, but no pesticides are effective after they have developed.

### Cultural Contro

- Choose varieties less susceptible
- Crop rotation for 2 or more years, (such as small grains, corn, cotton, or safflower)
- Eliminate volunteer onions and weeds.
- Use drip or furrow irrigation
- Apply nitrogen fertilizer only as necessary.
- Plant seed and transplants that are pathogen-free.
- Minimize injury to maturing or harvested bulbs.
- If these diseases are detected, consider harvesting early.
- Store bulbs at 0 to 2°C
- Use good sanitation during both the growing season and harvest.
- Insect control.

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